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GROUND-WATER FLOW PATTERNS FROM 1978
TO 1986 ON THE ALLIED-SIGNAL, INC.,
LCP CHEMICALS-WEST VIRGINIA, INC.
AND OLIN CORPORATION SITES,
MOUNDSVILLE, WEST VIRGINIA



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Geraghty & Miller, Inc.

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TO 1986 ON THE ALLIED-SIGNAL, INC.,
LCP CHEMICALS-WEST VIRGINIA, INC.
AND OLIN CORPORATION SITES,
MOUNDSVILLE, WEST VIRGINIA

April 1987

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TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION.....	1
Site-Specific Hydrogeology.....	2
Effects of Pumpage on Ground-Water Flow Paths.....	3
CONCLUSIONS.....	6
REFERENCES.....	8

TABLES

1. Summary of Construction Details of Steel-Cased Observation Wells at LCP Chemicals-West Virginia, Inc. and Olin Corporation, Moundsville, West Virginia
2. Summary of Construction Details of Polypropylene-Cased Observation Wells at LCP Chemicals-West Virginia, Inc., Moundsville, West Virginia
3. Summary of Construction Details of PVC-Cased Observation Wells at Olin Corporation, Moundsville, West Virginia
4. Water-Level Elevation Data at Allied-Signal, Inc., LCP Chemicals-West Virginia, Inc., and Olin Corporation Site, Moundsville, West Virginia
5. Water-Level Elevations Observed During the Quarterly Ground-Water Monitoring Program Conducted at the LCP Chemicals-West Virginia, Inc. Facility, Moundsville, West Virginia

FIGURES

1. Configuration of the Water Table on December 18-19, 1986
2. Configuration of the Water Table on December 9-12, 1985
3. Configuration of the Water Table on November 12-13, 1981
4. Configuration of the Water Table on April 5, 1978

GROUND-WATER FLOW PATTERNS FROM 1978 TO 1986
ON THE ALLIED-SIGNAL, INC., LCP CHEMICALS-
WEST VIRGINIA, INC. AND OLIN CORPORATION
SITES, MOUNDSVILLE, WEST VIRGINIA

INTRODUCTION

In September 1986, Allied-Signal, Inc. requested that Geraghty & Miller, Inc. reevaluate the ground-water flow patterns at the combined Allied-Signal, Inc./LCP Chemicals-West Virginia, Inc./Olin Corporation site in Moundsville, West Virginia. The purpose of the study is to define the current configuration of the ground-water flow system in the unconsolidated aquifer and determine if the reduced pumpage from the Ranney Collectors continues to contain ground water on-site, preventing off-site migration to the Ohio River or to the neighboring Moundsville Country Club well and Washington Lands wells.

A complete round of water-level measurements was made on December 18 and 19, 1986, when water levels were measured in all accessible monitoring wells and Ranney Collectors at the Moundsville site. These data were used to prepare a water-table map which was used to infer ground-water flow direction and assess the current influence of pumping on ground-water flow paths at the plant sites. In addition, Geraghty & Miller, Inc. reviewed historical water-level data and prepared selected water-table elevation maps to evaluate past ground-water flow patterns. The 1978, 1981, 1985 and 1986 water-table maps, when evaluated with data in the orig-

inal 1977 Geraghty & Miller, Inc. report, show that since 1978, no off-site migration has occurred or is occurring. As long as Ranney Collectors A and E, and another Ranney well (either C or D in the center of the site) continue to operate (as they have since 1978), contaminants will not migrate off-site.

Site-Specific Hydrogeology

According to previous Geraghty & Miller, Inc. hydrogeologic studies (1977, 1978, and 1984), the stratigraphy at the Moundsville site is complex. Surficial deposits vary greatly in composition and thickness as a result of extensive reworking during plant construction activities. These deposits consist primarily of earthen-fill material and naturally occurring floodplain deposits of fine-to-medium sand and silt and generally are not more than 10 to 20 feet thick.

Surficial deposits are underlain by glacial outwash deposits consisting of medium-to-coarse sand and gravel. These coarse-grained sediments were deposited in the Ohio River Valley during the recession of Pleistocene-age glaciers and form the main water-bearing unit of the unconsolidated aquifer. Beneath the study areas, the glacial outwash deposits are 45 to 90 feet thick and extend

to bedrock. The top of bedrock is the lower boundary of the unconsolidated aquifer system.

The depth to water at the Moundsville site varies from 20 to 75 feet below land surface. Under natural conditions ground water would flow toward the Ohio River where it would discharge. As discussed in this report, the pumping influence of the Ranney Collectors has significantly altered the ground-water flow system in a narrow band along the river bank where ground water flows to the Ranney Collectors; the pumping influence also induces infiltration from the river.

Effects of Pumpage on Ground-Water Flow Paths

Figures 1 through 4 were prepared with water-level measurements made in December 1986, December 1985, November 1981, and April 1978, respectively. Data from wells screened in perched zones were not used. Tables 1 through 3 contain the well construction details for the monitoring wells installed at the site. Table 4 contains the water-level data used to prepare Figures 1 through 4.

Figure 1 is the most recent water-table elevation map prepared with water-level data collected on December 18 and 19, 1986. The figure shows that the water-table elevation is below the level of the Ohio River along a narrow band adjacent to the river bank. This condition is caused by the

continuously pumping Ranney Collectors A, D, and E. Figures 2 through 4 also show that ground-water levels near the river are below the level of the river.

Ground-water flow directions inferred from potentiometric water-levels shown in Figures 1 through 4 demonstrate that, although ground-water flows generally toward the Ohio River, it is not discharging to the Ohio River within the property boundaries of the site. Under natural conditions ground water would discharge to the river; however, the Ranney Collectors have reversed the natural gradient of ground-water flow along the river bank, thereby inducing river water into the unconsolidated aquifer. As a result, the Ranney Collectors capture all ground water that flows through the site.

At present pumping conditions, ground water flows off-site only at the extreme northeast corner of the site near well cluster B-1 (see Figure 1). At this location, ground water is outside the influence of Ranney Collector E and resumes its normal course of flow to the river; however, ground water at this location is not contaminated.

Reduced pumpage at Ranney Collector E allows Ranney Collector D to have a greater influence on ground-water flow in the northwest part of the property. This situation is best illustrated by comparing Figures 1 and 3 which show

water-table configurations when Ranney Collector E is pumping at different rates.

The U.S. Environmental Protection Agency has expressed some concern that contaminated ground water may be migrating south off the property toward the Moundsville Country Club well and the Washington Lands wells. These wells are located approximately 1,000 feet and 3,000 feet, respectively, from the LCP Chemicals-West Virginia, Inc./Moundsville Country Club property boundary. Although pumpage records and water-level data are not available for either the Moundsville Country Club well or Washington Lands wells, the water-level data collected in the quarterly monitoring program conducted by LCP indicates that the remedial pumping from Ranney Collector A has captured all ground-water flowing through the LCP plant.

In addition to complete rounds of water-level measurements, which have been made every few years, measurements have also been made more frequently in selected wells to confirm that ground-water flow patterns remain constant. As shown from the available historical water-level data presented in Table 5, water levels observed in monitoring wells 9, 11 and 12 are at approximately the same elevation throughout the year. Therefore, an equipotential line can be drawn through these three wells and roughly parallel to the LCP plant-Moundsville Country Club property line at all

times of the year. Ground-water flow is perpendicular to the equipotential line and toward Ranney Collector A due to the influence of pumping. As a result, ground water, and any contaminants entering the ground-water system beneath the LCP plant, are contained on the property.

Table 5 also shows that in wells near the river, such as Cluster 38 and the Ranney Collectors, water levels remain below the normal pool elevation of 624 feet above mean sea level in the river, a level which is maintained by a downstream lock and dam. In addition to demonstrating that there is no off-site migration to the south, the data also indicate that there is no offsite migration to the river.

CONCLUSIONS

As shown in Figures 1 through 4 and the available historical water-level data presented in this report, the water-table elevation of the unconsolidated aquifer has remained below the water level of the Ohio River, in a narrow band adjacent to the river, from 1978 to the present. This condition is caused by the continuous pumping of Ranney Collectors A, D, and E.

Furthermore, ground-water flow directions inferred from historical water-level data indicate that the continuous pumping of Ranney Collector A has prevented ground water

from migrating south off the property toward neighboring wells. As long as the Ranney Collectors remain operational, there is virtually no possibility that contaminants entering the ground-water system will migrate south or west or to sites off the plant. Therefore, the Ohio River and the wells located at the Moundsville Country Club and Washington Lands do not appear to be in danger of intercepting contaminated ground-water originating from the site in Moundsville, West Virginia.

Respectfully submitted,

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Geraghty & Miller, Inc., (1984), RCRA Ground-Water Monitoring System LCP Chemicals-West Virginia, Inc., Moundsville, West Virginia, pp 5.

TABLES

FIGURES

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Table 1. Summary of Construction Details of Steel-Cased Observation Wells at LCP Chemicals-West Virginia, Inc. and Olin Corporation, Moundsville, West Virginia

Well No.	Depth (feet below land surface)	Screened Interval (feet below land surface)	Elevation of Top of Steel Casing ¹ (feet above mean sea level)	Elevation of Top of Steel Casing ² (feet above mean sea level)
1	38.2	34.7 - 38.2	706.93	706.93
2	75.0	71.5 - 75.5	700.29	700.29
3	94.6	91.1 - 94.6	689.96	well destroyed
4	85.4	81.9 - 85.4	669.58	
5	94.6	91.1 - 94.6	671.56	671.56
6	69.9	66.4 - 69.9	642.66	642.66
7	69.7	66.2 - 69.7	643.33	643.33
8	65.8	62.3 - 65.8	644.13	well destroyed
9	64.0	60.5 - 64.0	642.17	
10	84.7	81.2 - 84.7	668.43	668.43
11	96.2	92.7 - 96.2	680.30	680.30
12	94.3	90.8 - 94.3	693.81	693.81
13	89.1	85.6 - 89.1	705.16	705.16
14	85.5	82.0 - 85.5	686.46	686.46
15	32.0	29.0 - 32.0	644.17	646.01
16	35.8	32.8 - 35.8	645.98	646.01
17	54.3	51.3 - 54.3	651.09	653.92
18	51.7	48.7 - 51.7	653.50	
19	39.5	36.5 - 39.5	696.31	699.15
20A	75.3	72.3 - 75.3	659.27	660.66
20B	62.1	59.1 - 62.1	657.86	660.37
20C	51.2	49.2 - 51.2	657.51	660.29
21A	67.2	64.2 - 67.2	672.26	674.40
21B	52.1	49.1 - 52.1	671.47	674.32
22A	45.3	42.3 - 45.3	646.65	641.15
22B	27.5	24.5 - 27.5	644.17	642.01
23A	40.2	37.2 - 40.2	640.79	640.83
23B	31.9	28.9 - 31.9	638.82	640.44
24A	94.4	91.4 - 94.4	639.04	641.44
24B	61.1	58.1 - 61.1	636.92	641.30
24C	36.6	33.6 - 36.6	636.64	641.31
25A	74.0	71.0 - 74.0	635.38	639.61
25B	53.3	50.3 - 53.3	634.83	639.51
25C	32.2	29.2 - 32.2	634.33	639.55
26A	84.4	81.4 - 84.4	638.65	641.23

Table 1. (Continued)

Well No.	Depth (feet below land surface)	Screened Interval (feet below land surface)	Elevation of Top of Steel Casing ¹ (feet above mean sea level)	Elevation of Top of Steel Casing ² (feet above mean sea level)
26B	58.8	55.8 - 58.8	637.88	641.14
26C	37.3	34.3 - 37.3	638.09	641.17
27A	74.1	71.1 - 74.1	642.79	642.93
27B	53.6	50.6 - 53.6	641.41	641.53
27C	NA	NA	642.47	642.59
28A	77.3	74.3 - 77.3	641.34	641.22
28B	59.0	56.0 - 59.0	640.04	641.23
28C	42.9	39.9 - 42.9	640.33	641.22
29A	63.9	60.9 - 63.9	638.51	638.51
29B	43.7	40.7 - 43.7	638.11	638.11
29C	33.0	30.0 - 33.0	636.68	636.68
30A	71.6	68.6 - 71.6	638.62	640.45
30B	54.1	51.1 - 54.1	638.31	640.42
30C	37.2	34.2 - 37.2	639.25	640.52
31A	64.7	61.7 - 64.7	636.26	636.26
31B	44.1	41.1 - 44.1	635.68	635.68
31C	28.0	25.0 - 28.0	635.98	635.98
32A	88.3	85.3 - 88.3	652.83	652.87
32B	63.5	60.5 - 63.5	653.20	653.24
32C	43.6	40.6 - 43.6	652.36	652.41
33A	65.7	62.7 - 65.7	631.73	631.73
33B	44.1	41.1 - 44.1	631.64	631.64
33C	37.4	34.4 - 37.4	632.97	632.97
34A	75.3	72.3 - 75.3	639.53	639.53
34B	47.1	44.1 - 47.1	641.03	641.03
34C	29.5	26.5 - 29.5	640.13	640.13
35	34.1	31.1 - 34.1	662.10	662.14
36	19.8	16.8 - 19.8	661.26	661.23
37A	80.3	71.3 - 80.3	647.89	647.89
37B	64.4	61.4 - 64.4	646.12	646.12
37C	40.9	37.9 - 40.9	647.69	647.69
38A	70.1	67.1 - 70.1	638.14	638.14
38B	43.9	40.9 - 43.9	638.61	638.61
38C	28.5	25.5 - 28.5	637.45	637.45
39	43.9	40.9 - 43.9	689.29	689.29

Geraghty & Miller, Inc.

Table 1. (Continued)

Well No.	Depth (feet below land surface)	Screened Interval (feet below land surface)	Elevation of Top of Steel Casing ¹ (feet above mean sea level)	Elevation of Top of Steel Casing ² (feet above mean sea level)
RWA	NA	NA	658.30	NA
RWB	NA	NA	658.30	NA
RWC	NA	NA	658.30*	NA
RWD	NA	NA	658.30*	NA
RWE	NA	NA	658.50	NA

¹ Surveyed in May 1978

² Resurveyed in January 1982

* Estimated

NA - Not available

Table 2. Summary of Construction Details of Polypropylene-Cased Observation Wells at LCP Chemicals-West Virginia, Inc. Moundsville, West Virginia

Well No.	Depth (feet below land surface)	Screened Interval (feet below land surface)	Elevation of Top of Polypropylene Casing ¹ (feet above mean sea level)
HG-1	42.0	33.0 - 43.0	670.43
HG-2A	70.0	61.0 - 71.0	669.86
HG-2B	59.0	50.0 - 60.0	670.11
HG-2C	49.0	40.1 - 50.1	670.37
HG-3	58.0	49.0 - 59.0	670.16
HG-5A	85.6	65.6 - 85.6	678.71
HG-5B	64.4	55.4 - 64.4	679.40
HG-5C	19.0	6.0 - 14.0	680.00
HG-6A	94.0	74.0 - 94.0	661.25
HG-6B	73.8	53.8 - 73.8	661.13
HG-4	65.0	45.0 - 65.0	701.36
HG-7A	84.7	64.7 - 84.7	661.28
HG-7B	63.8	43.8 - 63.8	661.22
HG-8A	87.0	67.0 - 87.0	660.74
HG-8B	62.4	42.4 - 62.4	660.62
HG-9A	67.5	47.5 - 67.5	643.64
HG-9B	44.9	24.9 - 44.9	643.70
HG-10A	65.5	45.5 - 65.5	642.89
HG-10B	44.1	24.1 - 44.1	643.07

¹ Surveyed in January 1987

Table 3. Summary of Construction Details of PVC-Cased
Observation Wells at Olin Corporation,
Moundsville, West Virginia

Well No.	Depth (feet below land surface)	Screened Interval (feet below land surface)	Elevation of Top of PVC Casing ¹ (feet above mean sea level)
B1A	77.0	52.0 - 77.0	647.86
B1B	55.0	30.0 - 55.0	647.69
B2A	55.0	30.0 - 55.0	643.42
B2B	35.0	10.0 - 35.0	643.70
B3A	82.0	57.0 - 82.0	648.03
B3B	60.0	35.0 - 60.0	648.22
B4A	85.0	60.0 - 85.0	649.60
B4B	65.0	40.0 - 65.0	649.88
B5A	72.0	47.0 - 25.0	647.71
B5B	51.0	26.0 - 51.0	647.93
B6A	58.0	33.0 - 58.0	667.92
B6B	40.0	15.0 - 40.0	667.07
B7A	65.0	40.0 - 65.0	681.48
B7B	44.0	19.0 - 44.0	681.26
B8A	60.0	35.0 - 60.0	692.41
B8B	42.0	12.0 - 42.0	692.22
B9A	66.0	41.0 - 66.0	644.50
B9B	50.0	25.0 - 50.0	644.50

¹ Surveyed in January 1982

Table 4. Water-Level Elevation Data at Allied-Signal, Inc.,
LCP Chemicals-West Virginia, Inc., and Olin Corporation Site,
Moundsville, West Virginia

Well No.	December 1986 Elevation of Water Level ¹ (feet above mean sea level)	December 1985 Elevation of Water Level ² (feet above mean sea level)	November 1981 Elevation of Water Level ³ (feet above mean sea level)	April 1978 Elevation of Water-Level ⁴ (feet above mean sea level)
1	671.60	670.86	---	672.7
2	638.58	---	638.54	639.4
3	well destroyed	well destroyed	---	---
4	well destroyed	well destroyed	---	622.4
5	621.26	622.85	---	621.6
6	620.27	621.68	617.66	621.6
7	621.51	621.80	619.52	622.9
8	---	well destroyed	619.87	623.2
9	621.32	622.87	620.24	623.6
10	621.60	623.82	---	623.7
11	621.63	623.30	620.61	623.8
12	621.65	623.80	621.67	624.2
13	646.88	---	647.28	647.1
14	621.50	623.17	620.52	623.8
15	well destroyed	well destroyed	---	623.8
16	well destroyed	well destroyed	---	623.0
17	well destroyed	well destroyed	---	621.5
18	well destroyed	well destroyed	---	622.4
19	665.62	---	---	665.0
20A	621.46	---	---	622.4
20B	621.21	---	618.28	622.4
20C	621.03	---	618.25	622.7
21A	629.22	---	---	629.9
21B	629.09	---	---	629.7
22A	623.60	---	---	620.7
22B	623.67	---	625.02	623.5
23A	624.17	---	611.67	617.1
23B	624.28	---	---	617.2
24A	621.80	---	616.26	616.2
24B	623.46	---	614.14	617.1
24C	623.45	---	611.28	617.1
25A	623.70	---	---	617.6
25B	623.36	---	614.40	617.7
25C	623.36	---	613.66	617.9
26A	620.45	---	617.44	600.7
26B	dry	---	616.68	618.1
26C	623.93	---	611.90	619.6
27A	623.58	---	615.06	615.2
27B	623.41	---	615.25	615.6
27C	624.68	---	615.43	616.1

Table 4. (Continued)

Well No.	December 1986 Elevation of Water Level ¹ (feet above mean sea level)	December 1985 Elevation of Water Level ² (feet above mean sea level)	November 1981 Elevation of Water Level ³ (feet above mean sea level)	April 1978 Elevation of Water-Level ⁴ (feet above mean sea level)
28A	623.46	---	615.44	616.3
28B	623.64	---	616.64	613.3
28C	625.14	---	616.95	616.5
29A	623.09	---	618.52	621.5
29B	623.18	---	618.63	621.6
29C	622.58	---	619.83	622.8
30A	625.05	---	616.29	615.6
30B	624.38	---	616.38	615.8
30C	625.49	---	616.44	616.2
31A	well destroyed	well destroyed	well destroyed	622.3
31B	well destroyed	well destroyed	well destroyed	622.4
31C	well destroyed	well destroyed	well destroyed	622.3
32A	620.96	---	617.92	622.2
32B	623.04	---	617.87	622.2
32C	620.28	---	617.94	622.2
33A	well destroyed	623.18	618.02	622.0
33B	well destroyed	well destroyed	612.73	622.3
33C	well destroyed	623.33	617.95	622.3
34A	620.35	623.17	617.65	622.1
34B	620.68	---	617.53	622.2
34C	620.37	623.22	617.59	622.2
35	dry	---	627.55	628*
36	dry	---	dry	dry
37A	620.95	---	618.32	622.2
37B	618.58	---	616.67	620.8
37C	well destroyed	---	---	623.9
38A	620.57	622.93	---	621.5
38B	620.56	622.85	617.02	621.7
38C	619.62	623.37	617.14	622.1
39	652.42	---	652.48	653.2
Ranney A	617.90	614.80	---	621.9
Ranney B	620.69	622.30	---	621.0
Ranney C	619.22	---	---	622.0
Ranney D	606.63	619.25	---	622.2
Ranney E	622.23	---	---	---
HG-1	637.39	---	---	---
HG-2A	620.31	---	---	---
HG-2B	620.32	---	---	---
HG-2C	dry	---	---	---
HG-3	620.58	---	---	---

Table 4. (Continued)

Well No.	December 1986 Elevation of Water Level ¹ (feet above mean sea level)	December 1985 Elevation of Water Level ² (feet above mean sea level)	November 1981 Elevation of Water Level ³ (feet above mean sea level)	April 1978 Elevation of Water-Level ⁴ (feet above mean sea level)
HG-4	650.74	---	---	---
HG-5A	621.86	---	---	---
HG-5B	621.90	---	---	---
HG-5C	dry	---	---	---
HG-6A	620.57	---	---	---
HG-6B	621.48	---	---	---
HG-7A	621.40	---	---	---
HG-7B	621.49	---	---	---
HG-8A	621.47	---	---	---
HG-8B	620.69	---	---	---
HG-9A	621.52	---	---	---
HG-9B	621.60	---	---	---
HG-10A	621.51	---	---	---
HG-10B	621.55	---	---	---
B1A	628.12	---	---	---
B1B	627.70	---	---	---
B2A	623.49	---	---	---
B2B	624.23	---	---	---
B3A	628.39	---	---	---
B3B	628.94	---	---	---
B4A	621.49	---	---	---
B4B	621.49	---	---	---
B5A	619.29	---	---	---
B5B	620.12	---	---	---
B6A	dry	---	---	---
B6B	dry	---	---	---
B7A	623.68	---	---	---
B7B	dry	---	---	---
B8A	653.01	---	---	---
B8B	653.19	---	---	---
B9A	628.19	---	---	---
B9B	628.15	---	---	---

¹ - Measured on December 18-19, 1986

² - Measured on December 9-12, 1985

³ - Measured on November 12-13, 1981

⁴ - Measured on April 5, 1978

* - Estimated

--- Not measured

Table 5. Water-Level Elevations Observed During the Quarterly Ground-Water Monitoring Program Conducted at the LCP Chemicals-West Virginia, Inc. Facility, Moundsville, West Virginia

Monitoring Wells												
Date	1	5	9	11	12	38A	38B	38C	Ranney Well A	Ranney Well B	Ranney Well C	Ranney Well D
12/19/86	671.60	621.36	621.32	621.63	621.65	620.57	620.56	619.62	617.90	620.69	619.22	606.63
9/25/86	672.47	617.43	618.04	618.63	619.10	618.10	617.73	616.81	603.72	---	---	610.05
6/26/86	673.33	618.64	---	618.97	619.49	618.26	618.19	616.78	608.55	---	---	618.80
4/2/86	672.74	620.26	620.75	621.05	621.62	619.04	618.73	618.18	611.49	618.76	---	596.34
12/17/85	670.89	622.81	622.84	623.30	623.81	622.97	622.86	621.72	614.80	---	---	619.05
9/27/85	671.18	617.56	617.88	618.27	618.31	617.24	617.27	616.03	606.00	617.35	---	607.63
6/28/85	671.60	622.1	622.04	622.22	622.43	619.38	618.98	617.85	622.13	615.80	---	621.84
3/28/85	671.08	621.02	620.32	620.63	621.48	622.59	622.28	620.89	611.40	622.11	---	631.25
12/19/84	672.08	614.89	614.64	615.33	615.52	616.98	616.53	615.62	612.20	612.80	---	624.90
9/26/84	673.18	616.93	613.73	614.53	615.21	612.98	612.34	612.03	---	---	---	---
6/26/84	673.33	617.43	618.29	617.92	618.68	618.75	618.55	617.23	---	---	---	---
3/15/84	671.89	618.08	617.52	617.99	617.71	618.50	618.33	617.56	---	---	---	---
12/7/83	671.95	619.06	616.64	616.38	618.31	616.98	616.65	615.85	---	---	---	---
8/5/83	672.68	617.48	617.34	618.30	617.41	616.32	618.44	615.20	---	---	---	---
5/25/83	671.03	619.45	618.67	620.30	619.21	614.57	614.78	612.87	---	---	---	---
3/30/83	671.01	616.06	617.09	616.80	616.48	613.73	614.53	612.03	---	---	---	---
12/16/82	671.45	617.10	617.44	617.88	617.98	614.34	614.30	613.82	---	---	---	---
9/29/82	672.55	617.93	618.11	618.57	618.87	619.26	619.21	617.93	---	---	---	---
6/30/82	---	618.98	619.77	619.47	619.52	617.98	618.94	---	---	---	---	---
3/25/82	---	622.12	621.71	622.13	622.19	621.34	619.36	621.53	---	---	---	---
10/28/81	---	619.86	620.17	620.20	617.11	617.90	618.41	615.65	610.7	616.55	617.7	612.6
7/16/81	---	619.46	619.67	614.97	621.48	618.07	618.11	618.55	---	---	---	---

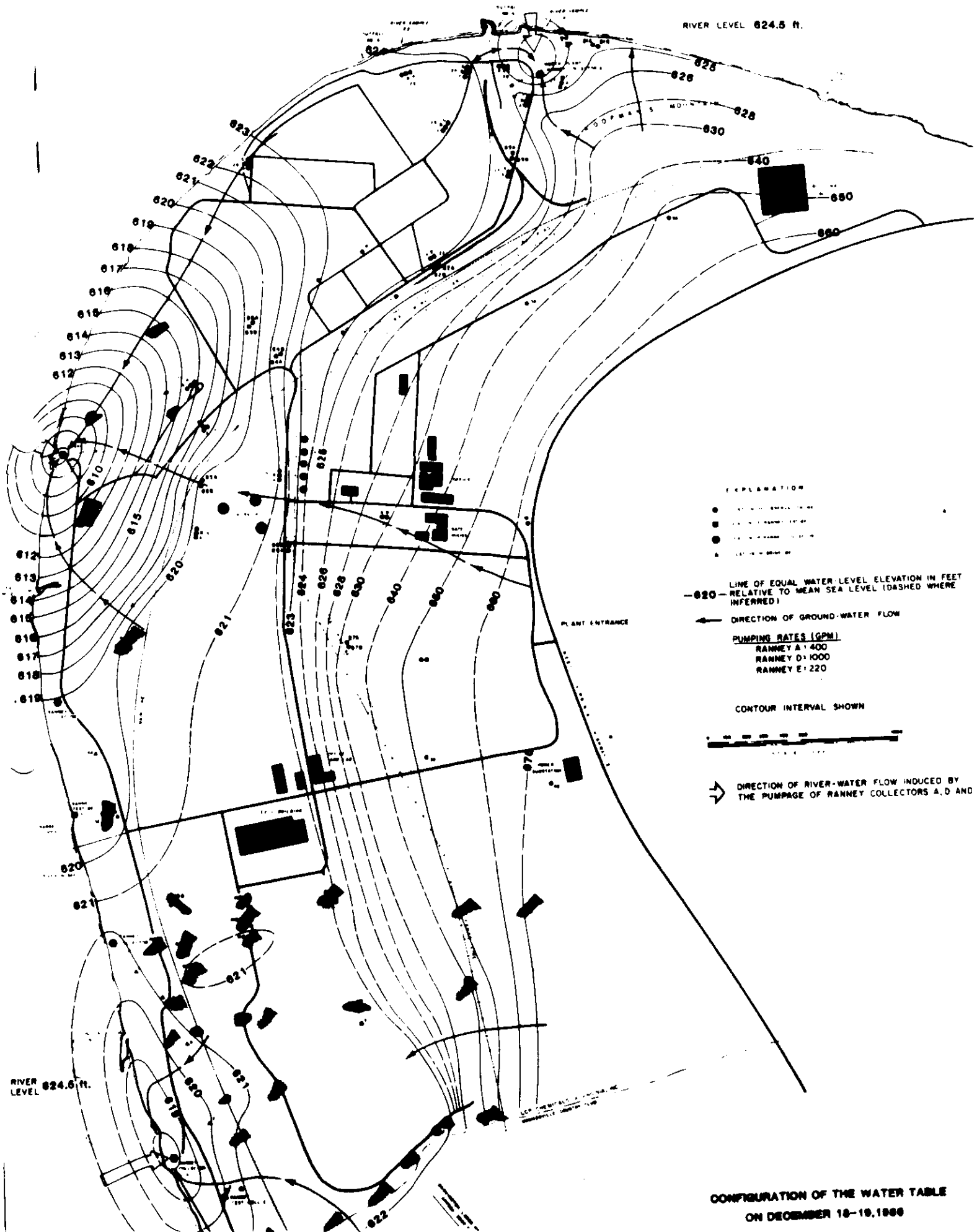
Table 5. (Continued)

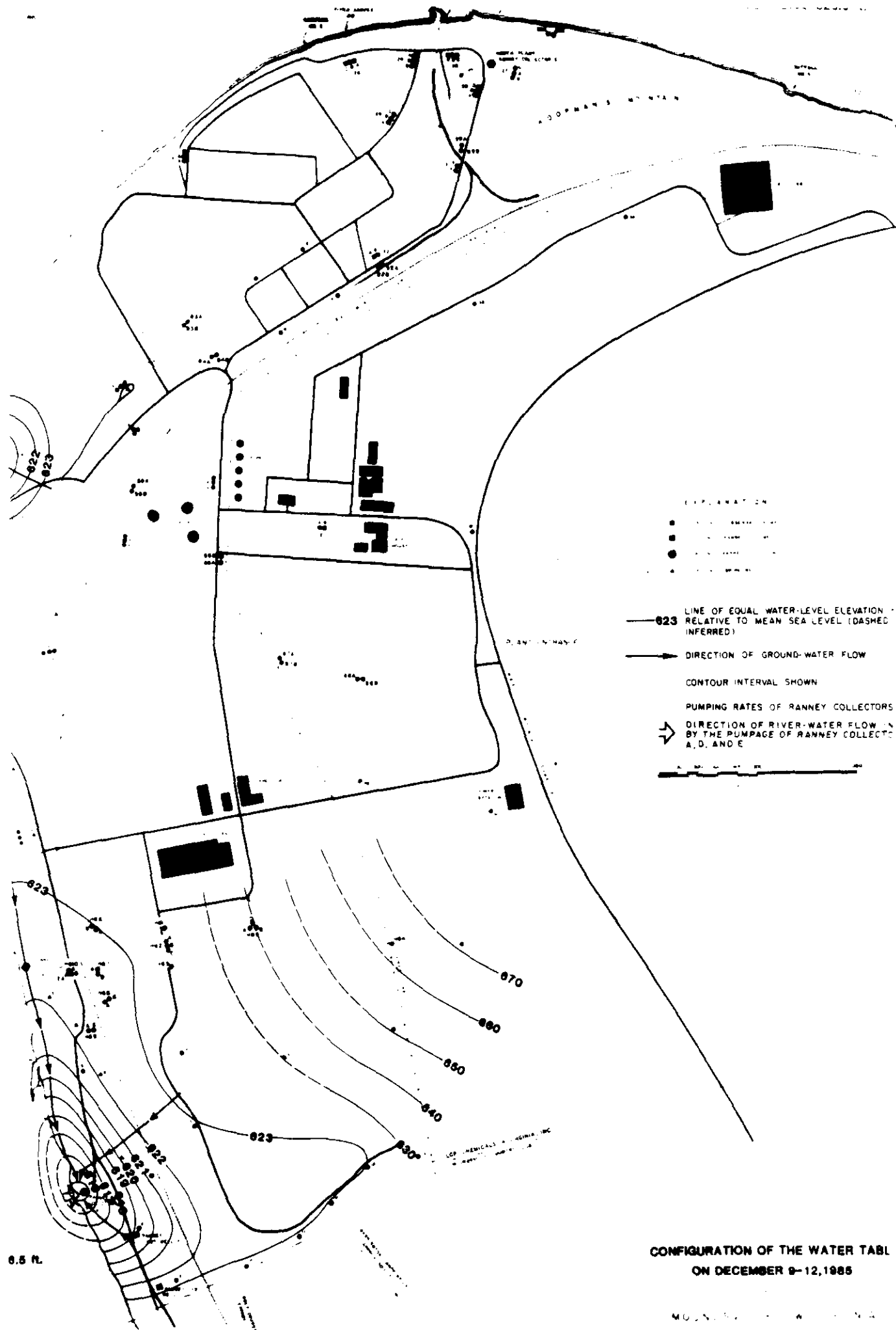
Monitoring Wells												
Date	1	5	9	11	12	38A	38B	38C	Ranney Well A	Ranney Well B	Ranney Well C	Ranney Well D
12/15/80	---	---	---	---	---	---	---	---	---	---	---	---
12/11/80	---	618.76	---	620.50	618.51	618.64	618.41	618.05	614.80	618.60	617.30	617.80
12/5/80	---	---	---	---	---	---	---	---	---	---	---	---
9/16/80	---	617.86	---	---	---	---	---	---	---	618.70	---	---
9/11/80	---	---	620.57	621.00	621.56	618.48	618.51	619.45	613.55	---	615.80	615.90
6/6/79	---	---	622.47	620.50	620.81	618.04	618.51	617.35	614.80	---	619.30	616.80
3/21/79	---	---	623.57	623.80	624.06	619.89	620.36	619.20	619.80	624.80	619.30	618.30
10/10/78	---	617.56	620.17	620.40	620.51	618.14	---	---	---	---	---	---
2/22/78	---	---	---	---	---	621.34	---	---	---	---	---	---
6/77	---	619.06	620.67	621.10	623.01	---	---	---	---	---	---	---

--- Not measured.

Note: Elevations are relative to mean sea level.

FIGURES





CONFIGURATION OF THE WATER TABLE
ON DECEMBER 9-12, 1985

